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(NASA-CR-195256) GLOBAL BAROTROPIC  
RESPONSE TO A TROPICAL FORCING  
N94-27408

The existence of equatorial westerlies over the eastern Pacific in the basic state allows the extratropical wave train, initiated over the tropical western Pacific, to propagate back into the tropics over the eastern Pacific (Fig. 1). However, penetration of the extra- tropical waves into the tropics is dependent on the phase of the forced equatorial Rossby waves (Fig. 2). As the tropics is deeper than the subtropics by westlies the cyclonic pair represented by westlies on the equator moves into the eastern Pacific

## 2. MODEL RESULTS

waves out of and into the tropics and the positive and negative phase of the Rossby waves result in blocking circulation over North America and typical plumes over equatorial eastern Pacific, respectively.

Zonally varying flow has been used to initialize numerical models and has been shown to play an important role in strong localized responses both in extratropics and the tropics. In this study, a climatological basic state of a barotropic model which consists of shallow water equations and a mass source centred at  $4^{\circ}\text{S}/120^{\circ}\text{E}$  to simulate convective heating over Indonesia appears not only over the western Pacific, where forcing is located, but also over the eastern Pacific where zonally varying basic state. The westward propagating equatorial Rossby waves excited by the forcing interact with the eastern Pacific where the response is related to the zonally varying basic state.

## 1. INTRODUCTION

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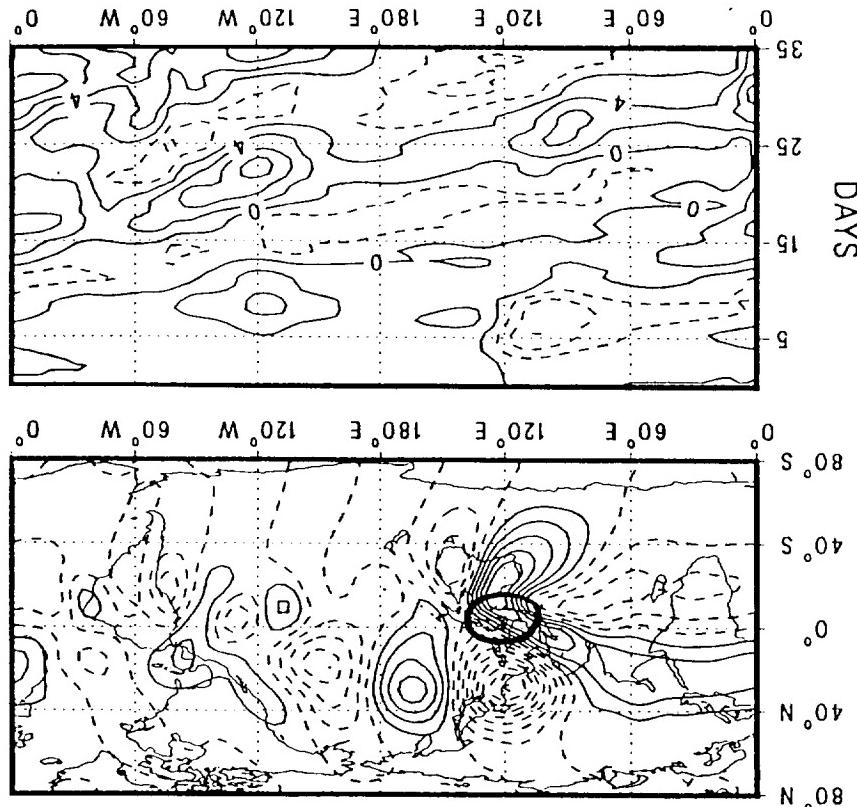


Fig. 1. Periturbation meridional wind at day 6 of the model simulation. Contour interval is 0.005 m-s<sup>-1</sup> with southertlies dashed and northertlies solid. Heavy solid line is the omitted. Zero contours are dashed. Solid and northertlies solid and southertlies dashed. Area enclosed by dashed and northertlies solid and southertlies dashed region.

Fig. 2. Hovmoller diagram of perturbation zonal wind along the equator. Contour interval is 0.4 m-s<sup>-1</sup> with westertlies solid and eastertlies dashed.

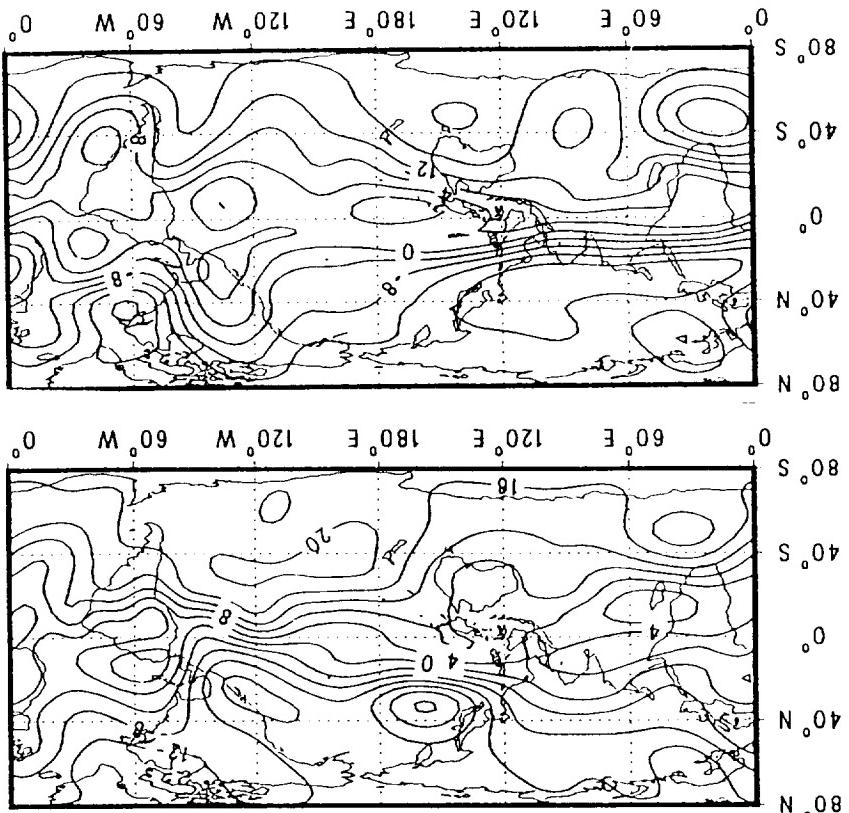


Fig. 3. Perturbation stream function at day 22  
of the model simulation except for day 28.  
Fig. 4. Same as Fig. 3.

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MCGurk, J. P., A. H. Thompson and N. R. Smith, 1987: Moisture Bursts over the Tropical Pacific Ocean. *Mon. Wea. Rev.*, 115, 787-798.

REFERENCE 3.

winter. The circulations in Fig. 3 and Fig. 4 oscillate with a period of 15 days during the course of the model simulation (see Fig. 2). Basically, a wavenumber one (Rossby scale pattern) is produced with smaller scale waves superimposed over the eastern Pacific and South America. The decreasing scale and phase speed of the equatorial Rossby waves may be due to the strong zonal wind in the basic state.